REMARKS

Claims 1-6, 8-11, 14, 15, 19-22, 24-33, and 41-49 are currently pending in the present patent application.

This amendment is being filed along with a Request for Continued Examination in response to the Advisory Action mailed September 27, 2005. In the Advisory Action, the Examiner did not enter amendments or consider arguments made in response to a first final Office Action mailed July 6, 2005. Accordingly, this amendment again presents for consideration the claim amendments and arguments made in response to the first final Office Action.

In the first final Office Action, the Examiner objected to claim 11 as containing a minor informality and this claim has been amended to eliminate this informality. The Examiner also rejected claims 2-6, 8, 15, 20-22, 24-31, 41-44, and 46 under 35 U.S.C. § 112, second paragraph, for failing to particularly point out and distinctly claim subject matter which applicant regards as the invention. The Examiner maintains with regard to claims 2, 24, and 46 that it is "unclear as to how an etching voltage can vary between a condition (plasma) and a physical location (wafer)."

A Web site http://www.plasmas.org/basics.htm (Plasma Science and Technology) provides the following descriptions of plasmas:

> Plasmas are conductive assemblies of charged particles, neutrals and fields that exhibit collective effects. Further, plasmas carry electrical currents and generate magnetic fields. Plasmas are <u>the most common form of matter</u>, comprising more than 99% of the visible universe, and permeate the solar system, interstellar and intergalactic environments. ... Because plasmas are conductive and respond to electric and magnetic fields and can be efficient sources of radiation, they can be used in innumerable applications where such control is needed or when special sources of energy or radiation are required. (emphasis added)

As set forth in applicants' prior amendment, a plasma is a "highly-ionized gas" as defined by Webster's Encyclopedic Unabridged Dictionary of the English Language (1994

Edition), or more specifically is a collection of charged particles containing about equal numbers of positive ions and electrons. There is really no difference between talking about a voltage drop across two solid forms of matter, such as two copper wires, or such a voltage drop across a gas and a solid, or across a plasma and a solid.

Claim 2 has been amended to recite that the second polymerizing etch comprises varying an etching voltage between a plasma around the wafer and the wafer. Claim 24 has been amended to recite that the etching voltages are between the substrate and the second plasma mixture of gases. Claim 46 has been amended to recite varying an etching voltage between a plasma around the wafer and the wafer. These amendments make it clearer that the voltages being controlled are between the wafer and plasma around the wafer. The plasma can be set at a voltage to develop a voltage drop between the plasma and the semiconductor wafer. More specifically, the etching chamber ***32*** as shown in the embodiment of Figure 16 is set at a chamber voltage V_C while the wafer ***20*** is kept at a wafer voltage V_W and plasma coming into contact with the etching chamber reaches a plasma voltage V_P higher by a known amount than the chamber voltage V_C. The recited plasma is a physical entity and not a condition. Accordingly, claims 2, 24, and 46 satisfy Section 112.

With regard to claim 24, the Examiner further rejected this claim under Section 112 for being unclear as to what is meant by removing/depositing parts in series. Paragraphs 25-27, for example, clearly describe the plasma etching process. The wafer ***20*** is placed in an etching chamber ***32***, in which a known mixture of gases flows in predetermined conditions of temperature, pressure and flow (**FIG. 16**). The etching chamber ***32*** is set at a chamber voltage V_C while the wafer ***20*** is kept at a wafer voltage V_W. The plasma coming into contact with the etching chamber ***32*** reaches a plasma voltage V_P higher by a known amount than the chamber voltage V_C. An etching voltage $V_E = V_P - V_W$ is present between the exposed surface of the wafer ***20*** (more specifically, of the substrate ***21***) and the plasma and this etching voltage is controllable through the wafer voltage V_W. The rate of removal of the silicon and the rate of microdeposition of the polymeric material of the plasma are affected by the etching voltage V_E. The etching voltage V_E is varied during the second polymerizing etch so as to control the growth of the second polymeric film ***33*** and thus the slope of the walls ***35*** of the trench ***31***. The second polymerizing etch in this embodiment is performed in discrete steps and comprises a number N of steps performed in succession as shown in

FIG. 17, each step associated with the etching steps are respective durations T_1, T_2, ..., T_N and respective increasing values V_{E1}, V_{E2}, ..., V_{EN} of the etching voltage V_E. Thereby, a discrete-ramp etching voltage V_E is supplied. The etching steps are moreover performed one after the other, in rapid succession, substantially without interruptions.

In view of this description, the removing and depositing recitations in claim 24 are clear and satisfy Section 112. Claim 24 recites removing portions of the substrate by parts in series, each portion in the series of removed portions corresponding to one of the etching voltages in the series of etching voltages. The etching steps are performed one after another in rapid succession, with each step having a corresponding etching voltage V_E to remove a corresponding portion of the substrate. Claim 24 also recites depositing a second polymeric film on the walls by portions in series, each portion in the series of deposited portions corresponding to one of the etching voltages in the series of etching voltages. For each etching voltage V_E the microdeposition of the second polymeric film on the walls is done for a corresponding deposited portion of the second polymeric film.

With regard to claim 45, this claim has been amended to recite that each trench has approximately a same constant angle relative to a surface parallel to a face of the wafer. This amendment eliminates any deficiencies of claim 45 under Section 112.

The Examiner further rejected claims 1-3, 9, 14-15, 19-21, and 45-47 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,807,789 to Chen *et al.* ("Chen"). In this rejection, the Examiner states the broad recitations in the claims do not "require the trenches to have a substantially constant slope through the entire trench sidewall" and that "clearly parts of the sidewalls of [Chen's] trench have a substantially constant slope."

Amended claim 1 recites a process for forming trenches with an oblique profile and rounded top corners. The process includes, through a first polymerizing etch, forming in a semiconductor wafer depressions delimited by rounded top corners and through a second polymerizing etch, opening trenches at said depressions. The second polymerizing etch is performed in variable plasma conditions around the semiconductor wafer to form trenches with oblique profiles having a substantially constant slope throughout substantially an entire sidewall of each trench.

Amended claim 1 expressly recites that the formed trenches have oblique profiles with substantially constant slopes throughout substantially an entire sidewall of each trench. The combination of elements recited in claim 1 is accordingly allowable. While

claim 1 has been amended, the undersigned would like to point out that there is simply no disclosure or suggestion in Chen that the formed sidewalls have a substantially constant slope, even in a small section. Chen generally refers to a desired structure of the trench, but the description is silent about side walls with constant slope. In fact, Figure 6 of Chen shows trench walls with gradually varying slope, from convex to concave, without any straight or "constant slope" sections.

There is simply no evidence that the process of Chen is capable of forming trenches with constantly sloping walls, nor to support the Examiner's statement that clearly parts of the sidewalls of Chen's trenches have constant slopes. Any curved surface can be characterized as having a constant slope between two points on the surface if these two points are chosen sufficiently close together. Thus, the constantly varying slope of the trenches of Chen cannot simply be said to have a substantially constant slope along a portion, or else every trench wall could be said to have a constant slope.

Independent claim 19 recites a method that includes forming a trench in an unmasked area of a substrate, the trench having inclined walls with a substantially constant slope and with rounded top corners. The trench is filled with a dielectric material. As previously discussed with reference to claim 1, Chen does not disclose or suggest trenches with inclined walls having a substantially constantly slope. The recited trench is defined by the inclined walls, and these inclined walls have a substantially constant slope. In contrast, the trenches of Chen are defined by sidewalls having a constantly varying slope. These trenches cannot be said to have a constant slope along a portion and the figures show no such sidewalls. Figure 6 of Chen shows sloped sidewalls that may be said to vary from concave to convex, or to have a gradually varying "S" shape. The Examiner cannot simply say the sidewalls of Chen must have a constant slope along a portion or else every trench sidewall could be said to have a constant slope, as previously discussed. Accordingly, the combination of elements recited in claim 19 is allowable.

Amended claim 45 recites a method for forming trenches with an oblique profile and rounded top corners in a wafer. The method includes forming depressions delimited by rounded top corners in a wafer with a first polymerizing etch and forming trenches at the depressions with a varying plasma polymerizing etch. The oblique profile of each trench has approximately a same angle relative to a surface parallel to a face of the wafer. Chen does not disclose or suggest trenches having oblique profiles, with each oblique profile

having approximately a same angle relative to a surface parallel to a face of the wafer. In contrast, the trenches of Chen can each be characterized as having profiles with a constantly varying angle relative to a face of the wafer. The combination of elements recited in claim 45 is therefore allowable.

Finally, the undersigned would like to point out that there is absolutely no disclosure or suggestion in Chen relating to the etching voltage or the chamber voltage. Chen controls etching via the gas pressure and RF power, *see, e.g.*, Abstract line 7, which is different than controlling the plasma-to-wafer voltage. The plasma-to-wafer voltage is not mentioned at all in Chen. Accordingly, dependent claims 2, 24, and any other dependent claims that recite control of the etching voltages are allowable over Chen for these additional reasons.

All dependent claims are allowable for at least the same reasons as the associated independent claim, and due to the additional limitations added by each of these claims.

Paragraph 26 of the specification has been replaced through the above amendments simply to expressly state that this paragraph relates to embodiments of the invention. This was implicit before and is true generally for all discussion under the DETAILED DESCRIPTION section of the specification, which discusses embodiments of the present invention.

The claims are in condition for allowance, which is respectfully requested. In the event additional fees are due as a result of this amendment, you are hereby authorized to charge such payment to Deposit Account No. 07-1897. If the Examiner believes that a phone interview would be helpful, he is respectfully requested to contact the Applicants' attorney, Paul F. Rusyn, at (425) 455-5575.

Respectfully Submitted,

GRAYBEAL JACKSON HALEY LLP

Paul F. Rusyn
Attorney for Applicant
Registration No. 42,118
155 – 108th Ave. NE, Suite 350
Bellevue, WA 98004-5973
(425) 455-5575